

Appl. No. : 09/460,630  
Filed : December 14, 1999

### AMENDMENTS TO THE CLAIMS

**Please cancel Claim 2, as indicated below.**

**Please amend Claims 1, 3, and 13, as indicated below.**

A complete listing of all claims is presented below with insertions underlined (e.g., insertion), and deletions struckthrough or in double brackets (e.g., ~~deletion~~ or [[deletion]]):

1. (Currently Amended) A CMOS pixel structure comprising:
  - a semiconductor substrate with dopants of a first conductivity type at a first concentration density, and with an insulating layer at its surface;
  - a collection region with dopants of a second conductivity type which is opposite the first conductivity type at a second concentration density, formed in the surface region of the semiconductor substrate;
  - a barrier region of the first conductivity type in the substrate, with a concentration density of dopants being higher than the concentration density of dopants in the substrate;
  - a dual-purpose electrode formed on the insulating layer, extending over both the surface of at least part of the collection region and over at least part of the substrate, the dual-purpose electrode being intended to be driven by a first voltage that causes an electrostatic potential which collects in an area of the collection region beneath the dual-purpose electrode charges generated by electromagnetic radiation and by a second voltage, which is higher than the first voltage, for transferring the charges from the collection region into a detection region, and
  - the pixel structure being an active pixel structure having an amplifier integrated in the pixel structure and coupled to the detection region for amplifying the collected charge.
2. (Cancelled)
3. (Currently Amended) The pixel structure recited in claim [[2]]<sup>1</sup> wherein said barrier region is extending at least partly under the dual-purpose electrode.
4. (Previously Presented) The pixel structure recited in claim 1 further comprising a detection region with dopants of the second conductivity type at a third concentration density, formed in the surface region of the semiconductor substrate and not bordering the collection region and being connected to read-out electronics.
5. (Previously Presented) The pixel structure recited in claim 1, wherein the collection region forms a junction with the semiconductor substrate.

**Appl. No.** : **09/460,630**  
**Filed** : **December 14, 1999**

6. (Previously Presented) The pixel structure recited in claim 5, wherein the junction formed is a photodiode.

7. (Previously Presented) The pixel structure recited in claim 1, wherein the surface regions of the semiconductor substrate beyond the collection region are barrier regions which have dopants of the first conductivity type at a concentration density larger than the concentration density of the semiconductor substrate and read-out electronics are formed within shielding regions.

8. (Previously Presented) The pixel structure recited in claim 7, wherein at least part of the charge carriers that are generated in the semiconductor substrate underneath the shielding regions are collected by the collection region.

9. (Previously Presented) The pixel structure recited in claim 1, wherein a pinning region with dopants of the first conductivity type at a fourth concentration density is within the surface region.

10. (Previously Presented) The pixel structure recited in claim 9, wherein the pinning region is not covered by the dual-purpose electrode.

11. (Previously Presented) The pixel structure recited in claim 10, wherein the pinning region is aligned with the dual-purpose electrode, and extends along the collection region.

12. (Cancelled)

13. (Currently Amended) The pixel structure according to Claim [[2]]1, wherein the barrier region substantially impedes the diffusion of charges to said detection region.